

## MOWER HEAD WITH MOVABLE GUARD

Background of the Invention

The present invention relates to a mower head. More particularly, the present invention relates to a mower head with a movable guard.

5         The invention finds particular application in conjunction with rotary brush and grass mowing and cutting apparatus for trimming highway medians and shoulders and will be described with particular reference thereto. It is to be appreciated, however, that the invention has other 10 applications including clearing saplings, small trees, brush, grass, and the like.

Heretofore, mowing heads have been mounted to tractors and other prime movers with various constructions including articulated arm assemblies and side arm assemblies. 15 The mower heads commonly include one or a plurality of rotating cutting blades which are housed within a shield structure. The shield typically includes an upper deck and a skirt which extends from the upper deck below the rotary cutting blades along all but the forward side of the mower 20 head. Various structures have been developed to allow grass and brush to pass under the forward side of the mower head into the path of the cutting blade but to inhibit other items

such as the limbs of the operator from passing into the path of the cutting blade. Such structures include a plurality of rake-like projections, a plurality of short lengths of chain, and the like.

5           Guarding the blades on a rotary cutter has always been a major problem. This is especially true when the cutter is attached to an extendible arm.

Since it is not practical to build the carrier and boom arm of sufficient strength to push trees, etc. over so  
10       that they can be cut, various configurations of detachable and hinge-type guards have been developed. Displacing the guard (the front portion of a mower housing) allows the operator to get the cutting blade close to the tree or brush to be cut in a manner similar to the way a skill saw or bench  
15       grinder functions.

Removing a straight front section of a rectangular or square mower housing, which acts as a guard, did not prove to be adequate. This construction provides a very limited cutting swath for the blades. Therefore, guards evolved  
20       whereby the front section of the mower housing would retract out of the way. This construction was disadvantageous because no shield extended downwardly to prevent the blades from throwing foreign objects when the guard is in its normal position.

25           Another problem with the prior art mower heads is that it is difficult to pass heavier brush and saplings below

the shield into the cutting blade. Frequently, the mower heads are mounted with a breakaway mounting to enable them to yield upon encountering a stationary object, such as a fence post. The breakaway mounting tends to inhibit the operator 5 from urging the mower head against the heavier brush and saplings with progressively a greater force until they yield and pass into the cutting blade.

Brush clearing devices commonly have exposed, rotary cutting blades. In areas along roadways and the like 10 such devices are disadvantageous because people may be harmed by the cutting blade or objects thrown by the blade.

Accordingly, it is desirable to develop a new and improved mower head with a movable guard which would overcome the foregoing deficiencies and others while meeting the 15 above-stated needs and providing better and more advantageous overall results.

#### Summary of the Invention

The present invention relates to a new and improved mower head with a movable guard. More specifically, the 20 mower head comprises a deck having at least three sides and at least one side wall depending from the deck. At least one cutting blade is rotatably mounted to the deck on an axis extending through the deck. The deck is disposed above and generally parallel to the blade. The deck further comprises 25 a flap depending from one of the sides of the deck. Two of the deck sides are normal to each other and a third of the

deck sides is positioned at an acute angle in relation to the other two deck sides.

A guard assembly comprises an actuating member mounted on the deck, a guard attached to the pivotable arm 5 and pivotally attached via a hinge to the deck along two sides of the deck, and a flap which depends from the guard. The guard includes a first wall which comprises an approximately straight edge and a second wall which comprises a plurality of angled sections.

10 The actuating member comprises a hydraulic cylinder and a piston. The cylinder includes a chamber surrounding the piston. The actuating member is mounted on the deck at a location spaced from the hinge.

15 A top surface of the guard and a top surface of the deck are located in the same plane.

In a second preferred embodiment, one of the deck sides can comprise a plurality of angled sections.

20 The guard has one wall comprising a plurality of angled sections which matingly interconnect with the angled sections of the deck side and a second wall which comprises a plurality of angled sections.

The mower head can further comprise a fourth side and at least three side walls, one depending from three of the four sides. Two of the side walls are rigid. A third 25 side wall comprises a flap depending from one side of the deck.

In a third preferred embodiment, the top surface of the guard and the top surface of the deck are located in different planes.

One advantage of the present invention is the 5 provision of a new and improved mower head.

Another advantage of the present invention is the provision of a mower head with a guard which is pivotably attached to the deck and provides protection for a cutting blade of the mower head.

10 Still another advantage of the present invention is the provision of a mower head with a guard pivotably attached by a hinge at an angle with respect to two other sides of the deck of the mower head to allow more of the blade to be exposed and allow easier access to trees, shrubs, etc. for 15 cutting.

Yet another advantage of the present invention is the provision of a mower head with a flap extending from the guard to protect the cutting blade when the guard is in its normal down position.

20 A further advantage of the present invention is the provision of a mower head with a guard which can be installed either in front of an angled main deck or above the main deck. If it is installed above the mower main deck, the front end of the main deck can be varied in shape.

25 Still other benefits and advantages of the invention will become apparent to those skilled in the art

upon reading and understanding the following detailed description.

Brief Description of the Drawings

The invention may take form in certain components  
5 and structures, preferred embodiments of which will be  
illustrated in the accompanying drawings wherein:

**FIGURE 1A** is a top plan view of a prior art mower head with a movable guard;

10 **FIGURE 1B** is a side elevational view of the prior art mower head with a movable guard of **FIGURE 1A**;

**FIGURE 2A** is a top plan view of a second prior art mower head with a movable guard;

**FIGURE 2B** is a side elevational view of the prior art mower head with movable guard of **FIGURE 2A**;

15 **FIGURE 3A** is a top plan view of the mower head with a movable guard according to a first preferred embodiment of the present invention;

**FIGURE 3B** is a side elevational view of the mower head of **FIGURE 3A**;

20 **FIGURE 4A** is a top plan view of the mower head with a movable guard according to a second preferred embodiment of the present invention;

**FIGURE 4B** is a side elevational view of the mower head of **FIGURE 4A**;

25 **FIGURE 5A** is a top plan view of the mower head with a movable guard according to a third preferred embodiment of

the present invention;

**FIGURE 5B** is a side elevational view of the mower head of **FIGURE 5A**; and

**FIGURE 6** is a perspective view of the mower head 5 with the guard in the open position according to the first preferred embodiment of the present invention.

**Detailed Description of the Preferred Embodiments**

Referring now to the drawings, wherein the showings are for purposes of illustrating preferred embodiments of 10 this invention only and not for purposes of limiting same, **FIGURE 3A** shows a mower head **C** according to a first preferred embodiment of the present invention.

A mower includes a prime mover, such as a tractor (not shown), which is self-propelled to move at least in 15 forward and rearward directions. An arm assembly (not shown) is operatively connected at one end with the prime mover and at the other end with the mower head. A positioning control means, such as a plurality of hydraulic cylinders, controls the position of the arm assembly relative to the prime mover 20 and the mower head. In this manner, the position and orientation of the head is selectively variable. The arm assembly can be a boom assembly which includes at least two pivotally connected arms, one of which is pivotally connected with the prime mover and the other of which is pivotally 25 connected with the mower head.

As shown in **FIGURES 1A** and **1B**, one known guard

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system **A** (U.S. Patent No. 4,445,312) comprises a deck 10, with a guard 12 with a front surface 14 which is spring loaded by spring 16. A blade 20 is positioned below the deck and is mounted to a motor 22, via an axis extending through 5 the deck. An opening 24 exposes the blade when the guard swings out of the way, against the bias of the springs pulling it into its down position. Another known design replaces the springs with a hydraulic actuation system. While both of these constructions allow the blades to be 10 exposed in the front for cutting purposes, they provide a very limited cutting swath for the blades.

Another popular type of guard is a swinging guard. Referring to **FIGURES 2A** and **2B**, the swinging guard system **B** has a guard 30 which swings rearward above blades 32 and 15 below a mower deck 34, and it allows the cutter blades to contact the material to be cut through an opening 36. The blades 32 are drivingly connected to a motor 38. However, when the guard **B** is in the closed or forward position, there 20 is nothing extending downward in a vertical direction to prevent the blades from throwing foreign objects.

Referring to **FIGURES 3A** and **3B**, the mower head **C** according to the present invention comprises a polygonal deck 50 having sides 52, 54, 56, 58, and 60. The deck can be fabricated from metal. Side 54 is positioned at an acute 25 angle with respect to sides 52 and 56. Sides 52 and 60 are oriented approximately normal to each other. Similarly, side

58 is positioned approximately normal to each of sides 56 and 60.

Side walls depend from each side of the deck. More specifically, side wall 62 depends from side 56, side wall 64 5 depends from side 52, side wall 66 depends from side 60, and side wall 68 depends from side 58. In this embodiment, side walls 62, 66, and 68 are rigid. However, side wall 64 comprises a flap which is flexible and moves out of the way when cutting is performed. The flap can be made from rubber, 10 cloth, or any other flexible material. It can also be comprised of short metal chains or another movable type of material.

A cutting blade 70 is rotatably mounted to the deck 50 on an axis 72 which extends through the deck. The deck 50 15 is disposed above and generally parallel to the blade 70.

A guard assembly 80 is attached to the mower head. The guard assembly comprises an actuating member 82 mounted on the deck 50. A guard 84 is pivotally attached to the deck along sides 52, 54 of the deck. A flap 86 which depends from 20 the guard 84 extends in front of the blade 70.

The actuating member 82 can comprise a hydraulic cylinder 90 and a piston 92. The actuating member 82 is pivotally attached at its piston rod end to a flange 94 which is rigidly mounted to the guard 84. The actuating member 82 25 is pivotally attached at its cylinder end to a flange 96

which is rigidly mounted to the deck 50.

A motor 100, which can be a hydraulic motor, is drivingly connected to the cutting blade 70 through axis 72. The motor 100 is positioned on a top surface 102 of the deck 50. The motor 100 is connected with a source of fluid power by hydraulic lines (not shown) extending along an arm connected to the prime mover.

The guard 84 has a top surface 104 which, in this embodiment, is located in the same plane as the top surface 102 of the deck 50. A hinge 110 pivotally mounts the guard 84 to the deck 50. The guard 84 includes a first wall 120 which comprises an approximately straight edge 121 and a second wall 122 which comprises a plurality of angled sections 124, 126, 128, 130, 132, 134, 136.

In operation, the guard is lifted out of cutting path of the mower head through a pivoting motion along the hinge 110 by the actuating member 82. The guard is lifted at an angle with respect to the path of travel of the deck and is pulled toward the center of the deck, as shown in FIGURE 6. The blade then extends beyond the side walls of the deck through an opening, as shown in FIGURE 6, and is able to cut trees, shrubs and the like.

Referring now to FIGURES 4A and 4B, a second preferred embodiment of the mower head is shown. In this embodiment, like elements with the embodiment of FIGURES 3A

and **3B** are denoted by like reference numerals with a primed ('') suffix and new components are identified by new numerals.

The mower head **D** of **FIGURES 4A** and **4B** has the same features as the head shown in **FIGURES 3A** and **3B** except that a top 5 surface **150** of a guard **152** is located in a different plane from a top surface **102'** of a deck **50'**. This allows a side **54'** of the deck adjacent the guard **152** to vary in shape with respect to the guard. Thus, side **54'** can have an extension **154** protruding under the guard **152** and over a blade **70'** thus 10 covering more of the blade when the guard **152** is in the open position.

Referring now to **FIGURES 5A** and **5B**, a third preferred embodiment of the mower head is shown. In this embodiment, like elements with the embodiment of **FIGURES 3A** 15 and **3B** are denoted by like reference numerals with a double primed ("") suffix and new components are identified by new numerals. The mower head **E** of **FIGURES 5A** and **5B** has the same features as the head of **FIGURES 3A** and **3B** except a side **160** of a deck **50"** has a plurality of angled sections **170**, **172**, **174**, **176**. A guard **178** also has a plurality of angled sections **180**, **182**, **184**, **186** which matingly interconnect with the angled sections **170**, **172**, **174**, **176** of the deck side **160**. The angled portions of the deck side **160** protrude further over the top of the blade. This construction is advantageous 20 because it provides additional shielding of the blade, as 25

well as preventing debris from flying up from the blade during cutting.

The invention has been described with reference to the preferred embodiments. Obviously, alterations and 5 modifications will occur to others upon a reading and understanding of this specification. It is intended to include all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.